Advanced Metallurgical Research

Funding Profile by Subprogram

(dollars in thousands)

	FY 2003 Comparable Appropriation	FY 2004 Comparable Appropriation	FY 2005 Base	FY 2005 Request	FY 2005 Request vs Base	
					$ Change	% Change
Advanced Metallurgical Research	5,961	9,876	9,876	8,000	-1,876	-19.0%
Total, Advanced Metallurgical Research	5,961	9,876	9,876	8,000	-1,876	-19.0%

Mission

The Advanced Metallurgical Processes program conducts inquiries, technological investigations, and research concerning the extraction, processing, use, and disposal of mineral substances under the mineral and materials science program at the Albany Research Center (ARC) in Oregon.

Projects are focused on areas where there are large potential public benefits, but where industry would not invest on its own. The program addresses the full life cycle of materials production and cost-effective processing of improved materials through to their disposal and recycling. For example, the program seeks to determine the factors that limit service life of materials in industrial, structural, or engineering applications and to provide solutions to service-life problems through new materials technology. This is an area where the benefits to any single firm may be too low to attract investment, but will sum to large economic improvements if applied throughout the economy.

Another focus is to develop and demonstrate technologies that will create public benefits by reducing waste and pollution. For example, for the last four years the Program has sought ways to sequester CO_2, a greenhouse gas, by converting it to a stable mineral form; such a process, if proved practical and economic, could contribute to Fossil Energy's goal of a zero emission power plant. Thus, the research at ARC directly contributes to Fossil Energy's objectives by providing information on the performance characteristics of materials being specified for the current generation of power systems, on the development of cost-effective materials for inclusion in Vision 21 systems, and for solving environmental emission problems related to fossil fired energy systems. The program at ARC stresses full participation with industry through partnerships and emphasizes cost sharing to the fullest extent possible.

Benefits

The Advanced Metallurgical Program creates public benefits by carrying out long-term, high-risk research on materials that are key to the energy industry. Another focus is to create public benefits through the development of technologies that reduce waste and pollution.

Detailed Justification

(dollars in thousands)

	FY 2003	FY 2004	FY 2005
Advanced Metallurgical Research	**5,961**	**9,876**	**8,000**
■ **Advanced Metallurgical Processes**	**5,901**	**9,777**	**7,920**

In FY 2005, continue research to contribute to Fossil Energy's Vision 21 Systems by extending component service lifetimes through the improvement and protection of current materials, by the design of new materials, and by defining the service operating conditions for new materials in order to ensure their safe and effective use. Emphasis is placed on high-temperature erosion testing and modeling in environments anticipated for Vision 21 concepts, on the development of sulfidation/oxidation resistant materials, and development and repair of refractory materials, for coal gasifiers. The Albany Research Center will participate in an effort to develop, fabricate and evaluate the performance of materials to be used in solid oxide fuel cell applications. These could include metallic interconnects, seals, heat exchanger materials and reformer materials to support the Solid State Energy Conversion Alliance's (SECA's) goal of significantly reducing the cost of producing commercial, environmentally friendly solid oxide fuel cells. Continue research focused on developing an economically and environmentally acceptable integrated process for disposal of carbon dioxide. Redirect emphasis to application of mineral carbonation reactions to address leakage/sealing issues in geological sequestration approaches. *Participants include: ARC*.

FY 2004 funding continued development of advanced refractories for IGCC applications, CO_2 sequestration via mineral carbonation, advanced austenitic steels, and microchannel reactors for reformer and heat exchanger applications. In addition, efforts to support materials development for solid oxide fuel cell applications were initiated. *Participants included: ARC*

■ **Program Support**	**60**	**99**	**80**

In FY 2004, fund technical and program management support.

Total, Advanced Metallurgical Research	**5,961**	**9,876**	**8,000**

Explanation of Funding Changes

	FY 2005 vs. FY 2004 ($000)
Advanced Metallurgical Research	
• Redirect and reduce sequestration research related to mineral carbonation approaches. Eliminate funding for oxidation/sulfidation resistant materials development. Reduce funding levels for ultra-super critical steam turbine materials development. General reduction in research directed at fundamentals of materials performance in high temperature Fossil Energy applications	-1,857
• Program direction	-19
Total Funding Change, Advanced Metallurgical Research	**-1,876**